Lat 39.31460 Lon -122.95490

United States Department Of Agriculture | Forest Service | Shasta-Trinity National Forests

Reply To: 3420 Date: August 9, 1989

Subject: Evaluation of Pine Plantations in the Round Burn, Upper Lake Ranger District (Report No. N89-16)

To: Forest Supervisor, Mendocino National Forest

On August 1, 1989, Dave Schultz, Entomologist, and I met with Craig Edberg, Upper Lake Ranger District, to examine pine plantations in the Round Burn along Road 17N27 (T. 17 N., R. 10 W., section 23). Two concerns were expressed by the District. First, what options are available to manage sugar pine that are being infected by white pine blister rust, primarily in plantations with a large component of sugar pine. Second, what is the prognosis for many of the plantations that are becoming densely stocked and what is the need for precommercial thinning.

The plantations we visited contain various proportions of ponderosa and sugar pine. The pines range in size from sapling to small sawtimber. Plantation ages vary from about 15 to 25 years. Crown closure is occurring in plantations with the larger trees. Live crown ratio was generally 50% or higher.

Little pest activity is occurring in the ponderosa pine. Evidence of recent white pine blister rust infection (caused by Cronartium ribicola) is visible in the sugar pine. This is primarily branch flagging and cankers in the lower whorls. Mortality and top-killing of trees has not yet occurred. Some of the branch cankers have entered the main stem and bole cankers are developing. Most of the trees either are not yet infected or have only 1 or 2 branch infections.

MANAGEMENT ALTERNATIVES

1. No Action. Plantation yields will vary with the proportion of sugar pine in the stand and stocking density. Most of the sugar pines will be killed by blister rust before they become merchantable. Surveys of sugar pine in natural stands found that only 59% of trees in the 5-6 inch dbh range at the time of infection are likely to survive to 12 inches dbh. The proportion drops dramatically for smaller trees that are infected. Trying to grow these trees beyond 12 inches dbh increases the likelihood of mortality or top-killing. Since most of the sugar pine are retaining their lower branches, the chance for new infections and subsequent tree death will remain high.

The loss of sugar pine in some plantations may benefit the residual ponderosa pine by reducing intertree competition and improving the vigor of the ponderosa pine. In some plantations, sugar pine stocking is a large enough component that their loss will leave an understocked stand. The level of stocking when this occurs depends on site quality, stand age, and distribution of the sugar pine.

Estimating the time and amount of ponderosa pine mortality from bark beetle attacks in these plantations is difficult. The most comparable extensive plantations of older ponderosa pine are on the west side of the Sierra Nevada. Certain site and climatic differences in the Coast Range may result in a somewhat different outcome than that which has been previously seen in the Sierra Nevada. Unthinned ponderosa pine plantations there have become susceptible to attacks by pine engravers, Ips spp., and western pine beetle, Dendroctonus brevicomis, at about 30 years of age. Attacks by both these beetles tends to result in groups of dead trees, rather than scattered mortality. During periods of favorable precipitation, attacks are likely to result in only a few small mortality spots, with most of the plantation remaining densely stocked. Beetle attacks made during drought periods in older, unthinned ponderosa pine plantations in the Sierra Nevada have resulted in the loss of up to one-third of the stems in a single year. The mortality was not evenly distributed, but consisted of areas still densely stocked, interspersed with mortality groups up to an acre in size. It will be possible to grow some of the plantation ponderosa pine on the Upper Lake District to commercial size without thinning, but the combination of slow growth in the overstocked areas and understocking in the mortality spots will result in decreased productivity in many of the plantations.

2. Treat Sugar Pine. In some plantations, healthy and infected sugar pine could be treated to reduce the effect of blister rust. Selecting appropriate plantations for this treatment should be based on the level of stocking without sugar pine, the level of rust infection, the number of prunable sugar pine, and the size of the sugar pine. Treatment involves pruning branches from the lower crowns of sugar pines that are not infected or only have prunable infections. The following guidelines should be used to determine which trees can be pruned.

a. Do not prune trees that have cankers in the bole.

b. Do not prune trees where the closest margin of the branch canker is less than 4 inches from the bole.

c. Prune all branches up to one-half of tree height or what can be reached, whichever is less.

d. Prune individual lethal infections (>4 inches and <24 inches from bole) that are above the general area of pruning. If this is not possible, then do not prune the tree.

Most of the infections observed were in the lower branches of the trees. By pruning all of the lower whorls from infected and uninfected trees, the amount of target area for the fungus to infect is reduced and the likelihood of new infections decreases. Removing all branches in the lower half of infected trees also reduces the need for identifying and removing individual branches and increases the probability that all infected branches will be removed.

Pruning sugar pines would increase the number that reach merchantable size. Although some pruned trees may still become infected and die, the majority in these stands would likely survive if pruned according to the above guidelines.

This would provide for species diversity in the plantations and reduce the effects of possible other future pest outbreaks.

3. Thin Plantations. Maintaining tree vigor will reduce the likelihood of bark beetle activity and tree mortality. Maintaining the appropriate amount of biomass for the site is the best way to achieve this. For many of these plantations this means that they may need to be thinned. The appropriate stocking level should be determined for each plantation based on site quality, objectives, and growth and yield projections.

The type of thinning planned, precommercial or commercial, should be based on average tree size in the plantation. Ideally, the optimum time for reducing stocking levels is when these densely stocked plantations are still sapling size. Once the trees become larger, cost of thinning and amount of slash become limiting factors. In plantations with larger trees, an early commercial thinning may be more appropriate. The commercial thinning should not remove all of the biggest and best trees, but should remove a sufficient volume to make the thinning economical and to attain the desired stocking level and spacing. Some precommercial thinning of suppressed trees may also be accomplished. Leave trees should be mainly the codominants and some intermediates. The trees should have good crowns, not be damaged from logging, and be properly spaced. Plantation yields should not suffer and the time until the leave trees become merchantable will be shortened.

Treatment of the slash following thinning will reduce the probability of building up a population of pine engravers that could kill some of the residual trees. Thinning during the period from mid-July through December has a lower potential for pine engraver buildups in slash than during the rest of the year. The objectives of slash treatment are to remove the foliage and branches to expose the main stem to the sun, and to cut or break the stem into short pieces to make it less suitable for breeding habitat. This can be done by lopping and bucking, or by use of a chipper or rotary masticator. Piling of the stems over 3 inches diameter should be avoided until the material has dried.

When considering the need for thinning these plantations, the amount of sugar pine and the amount of lethal rust infection needs to be considered. If treatments as mentioned in 2. above are not undertaken, then the sugar pine component should not be considered when determining the existing stocking level in a plantation. Thinning and stand disturbance could cause an increase in the amount of Ribes, the alternate host of blister rust, in the stand. This could increase the amount of blister rust. The impact of any such increase would be greatest in the smaller size classes of trees. Also, thinning will reduce the rate of natural pruning of the lower branches. This will increase the chances for new infections on the leave trees. Both of these should be considered when determining appropriate stocking levels, especially in plantations with sapling size trees.

Forest Pest Management suppression funds may be available to prune designated sugar pine crop trees to remove lethal blister rust infections in some of the plantations we looked at. Standards for such projects, and requirements and procedures for obtaining funding are listed in FSM 3431 and 3432. We can assist in providing the documentation to request such funding, if desired.

If you have any questions about this evaluation or need further assistance, please contact Gregg DeNitto or Dave Schultz at (916)246-5101 (DG R05F14A).

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